INSTRUCTION MANUAL SUPPLEMENT MODEL 4335-F

MP MASTER
MA26106

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GENERAL DESCRIPTION

The Triplett Model 4335-F is the AC version of the 4235-F Digital Panel Meter. The 4335-F consists of a 100.0 mV 4235-F Digital Panel Meter with an AC to DC converter board mounted to the rear of the case.

The 4335-F responds to the average value of the input signal and is scaled to indicate the RMS value of a sine wave. It is available as an AC voltmeter with a choice of five different ranges or as an AC current meter also with a choice of five different ranges.

This supplement applies only to the 4335-F but everything which is said in the 4235-F manual applies equally to the 4335-F with the exception of the following sections:

SPECIFICATIONS	P 4
FIELD RANGE CHANGES	P 11, 12
CALIBRATION	P 15, 16

These sections as they apply to the 4335-F are covered in this supplement.

SPECIFICATIONS

VOLTMETERS

AC VOLTS Range	FREQUENCY	ACCURACY (23°C ±1°C)
199.9 mV	40 Hz to 10 KHz	± .2% RDG ±1 DIG
	10 KHz to 20 KHz	± .3% RDG ±1 DIG
1.999 V	40 Hz to 10 KHz	± .3% RDG ±1 DIG
	10 KHz to 20 KHz	± .4% RDG ±1 DIG
19.99 V	40 Hz to 10 KHz	± .3% RDG ±1 DIG
	10 KHz to 20 KHz	± .4% RDG ±1 DIG
199.9 V	40 Hz to 10 KHz	± .4% RDG ±1 DIG
1000 V	40 Hz to 1 KHz	± .4% RDG ±1 DIG

MAXIMUM DC COMPONENT:

1000 V for all units except 1.999 V unit
400 V for 1.999 V unit

MAXIMUM AC OVERLOAD:

1100 V for all except the 199.9 mV unit and the 1.999 V unit
500 V for the 1.999 V unit
250 V for the 199.9 mV unit

INPUT IMPEDANCE:

10 M Ω shunted by less than 25 pf for all except the 1.999 V unit
1 M Ω Shunted by less than 25 pf for the 1.999 V unit

CURRENT METERS

AC CURRENT Range	ACCURACY (23°C ±1°C)	SHUNT RESISTANCE	MAXIMUM CURRENT
199.9 uA	± .5% RDG ±1 DIG	1 K Ω	10 mA
1.999 mA	± .5% RDG ±1 DIG	100 Ω	20 mA
19.99 mA	± .5% RDG ±1 DIG	10 Ω	100 mA
199.9 mA	± .5% RDG ±1 DIG	1 Ω	500 mA
1.999 A	±1.0% RDG ±1 DIG	.1 Ω	2.5 A

FREQUENCY RANGE:

50 Hz to 20 KHz

VOLTAGE DROP ACROSS TERMINALS

199.9 mV at full scale reading

SPECIFICATIONS COMMON TO BOTH VOLTMETERS AND CURRENT METERS:

TYPE OF RESPONSE:

Average sensing, RMS calibrated

TEMPERATURE COEFFICIENT:

$\pm$ .05% RDG/°C $\pm$ .02% F.S./°C

OPERATING TEMPERATURE RANGE:

0°C to 45°C

FULL SCALE STEP RESPONSE TIME:

3 seconds

FLOATING MEASUREMENTS:

The input common may be floated up to 1000 volts DC above power line ground.

POWER REQUIREMENT:

105 to 125 VAC 50-60 Hz 3 watts

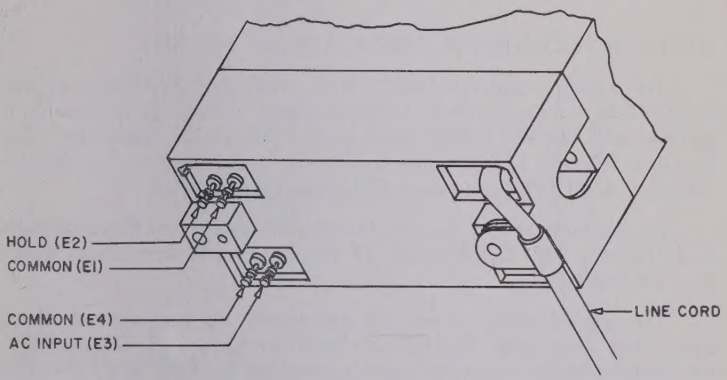
PHYSICAL CHARACTERISTICS:

Height — 2.359 max.
Width — 4.140 max.
Depth — 5.981 max.
Weight — 1 lb. approx.

INSTALLATION

PANEL MOUNTING. The procedure for mounting the 4235-F applies to the 4335-F.

ELECTRICAL CONNECTIONS. Two sets of terminals are provided for making electrical connections to the unit (See Fig. S 1).



ELECTRICAL CONNECTIONS

FIG. S 1

The AC input to the instrument is applied to the terminals on the lower left corner of the rear of the unit.

The hold terminals are located at the upper left corner of the rear of the unit. Connecting these terminals together will hold a reading.

THEORY OF OPERATION

GENERAL

The 4335-F consists of a 100 mV DC Digital Voltmeter preceded by an AC to DC converter. Operation of the Digital Voltmeter is described in the 4235-F manual. The function of the AC to DC converter is to scale the input signal and convert it to a DC level compatible with the Digital Voltmeter input.

AC TO DC CONVERTER OPERATION (See Fig. S 2)

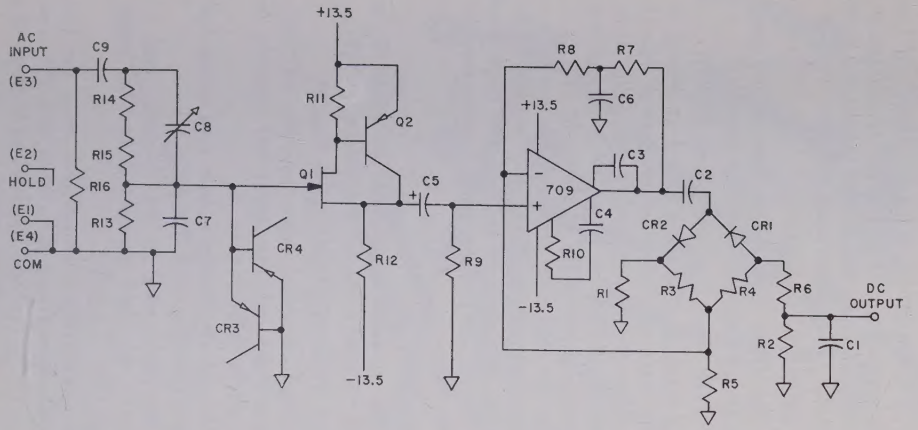
For voltage sensing models, R14, R15, and R13 form a precision 10 M Ω attenuator to scale the input voltage to a level compatible with the FET buffer input of the AC to DC converter. Capacitors C7 and C8 provide frequency compensation for the attenuator while C9 serves as a DC blocking capacitor.

For current sensing models, the current under test flows through shunt resistor R16. Once again C9 blocks any DC component which may be present.

The scaled signal from the attenuator or the current shunt drives the unity gain FET buffer circuit composed of Q1 and Q2. Overload protection for the gate is provided by CR3 and CR4. The low impedance output signal from the buffer drives the operational rectifier circuit composed of QA1, CR1 and CR2.

Op-Amp QA1 is connected as a non inverting amplifier with the rectifying diodes inside the feedback loop. This allows the Op-Amp to slew-open-loop until the diodes become forward biased at which time the closed loop gain is determined by precision feedback resistors. This arrangement prevents the diode forward voltage drop from appearing in the half wave rectified output of the AC to DC converter.

A low pass filter, R6 and C1, averages the half wave rectified output of the operational rectifier and drives the DC Digital Voltmeter circuit.



AC TO DC CONVERTER

SCHEMATIC DIAGRAM

FIG. S 2

CONVERSION OF 4235-F TO 4335-F

The conversion of a 4235-F Digital Panel Meter to a 4335-F is recommended to be performed at a Triplett Modification Center or other equally qualified facility due to the immensity of the modification. The modification procedure is as follows:

A. POLARITY DISPLAY DISABLE.

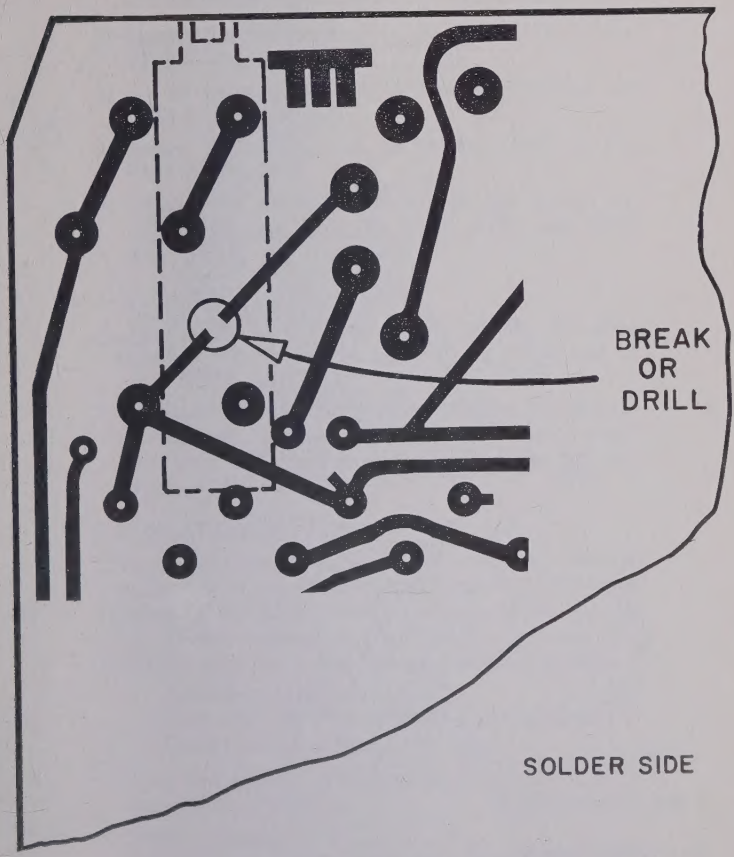
1. Remove the front bezel from the 4235-F and slide the circuit boards out of the case.
2. Remove Q132 from the board (See Fig. 7).
3. Break the track on the main board as shown in Fig. S 3. If the track is on the component side of the board, it will be necessary to drill a 1/8" hole in the solder side of the board on an imaginary line connecting two pads as shown in Fig. S 3. Insure that the drill does not protrude more than 1/16" as damage to R134 may result. Sight through the hole and insure that the track was broken. Use a sharp instrument if necessary to break the track.

B. DECIMAL SELECTION.

1. Follow the procedure outlined on page 9 to place the decimal point for the desired range.

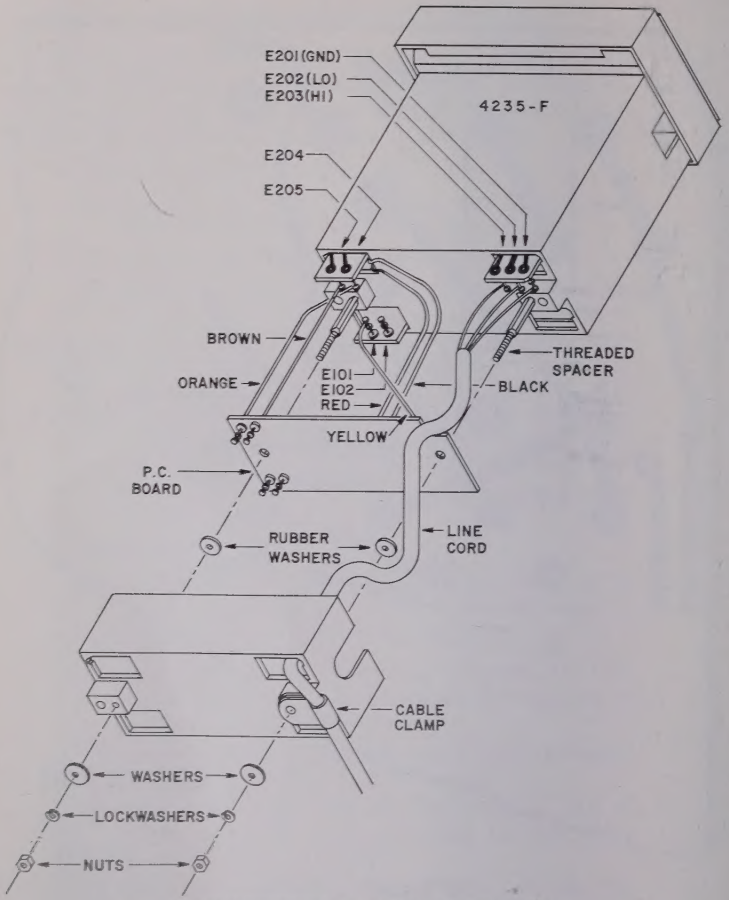
C. ELECTRICAL CONNECTIONS (See Fig. 8).

1. Feed the red and black wires from the AC converter board through the upper left opening in the rear of the 4235-F case.
2. Solder the red wire to the vacant pad connected to Q202 E (positive 13.5 V supply).
3. Solder the black wire to the negative end of C206 or to the pad connected to that point (negative 13.5 V supply).
4. Fold the power supply board over onto the top of the main board and slide them into the case while pulling the red and black wires through the back of the case as this is done.



POLARITY DISABLE

FIG. S 3



CONNECTIONS AND ASSEMBLY

FIG. S 4

5. Solder the brown wire to terminal E205 of the 4235-F (Fig. S 4).
6. Solder the orange wire to terminal E204 of the 4235-F (Fig. S 4).
7. Solder the yellow wire to terminal E101 of the 4235-F (Fig. S 4).
8. Thread the power cord through the cover cap and solder the leads to E201, E202 and E203 (Fig. S 4).

D. MOUNTING (See Fig. S 4).

1. Thread the #6 threaded end of the threaded spacers into the inside set of holes in the rear of the 4235-F case.
2. Assemble the AC converter board to the threaded spacers. Secure it by fitting the rubber washers onto the threads and sliding them forward against the board.

E. CALIBRATION.

Proper calibration requires an AC voltage or current standard with an RMS output equal to full scale reading of the 4335-F being calibrated. (ie: a 10.00 VAC 4335-F requires a 10.00 VAC standard). The standard must have the following specifications:

Accuracy: ±.05%
Frequency: 50 Hz, and, 10 KHz selectable
Distortion: Less than .1% total

1. Plug the unit in and allow 30 minutes for it to completely stabilize.
2. ZERO ADJUST
   (a) Short the AC converter input (E3) to common (E4).
   (b) Adjust the front bezel zero adj. pot R128 for a 000 indication.

PART # 89-19-	RANGE	R 13	R 14	R 15
1	199.9 mV	10 M 15R-106 JB	27 K 15R-273 KC	OMIT
2	1.999 V	100 K [1] 15K-1003 WC5	909 K [1] 15K-9093 WC5	
3	19.99 V	90.9 K [1] 15K-9092 WC5	4.49 M [1] 15K-4494 WC6	
4	199.9 V	9.09 K [1] 15K-9091 WC5		
5	1000 V	909 Ω [1] 15K-9090 WC5		
7	199.9 uA	2.7 M 15R-275 KC	27 K 15R-273 KC	OMIT
8	1.999 mA			
9	19.99 mA			
10	199.9 mA			
11	1.999 A			

1. 1% 50 PPM/°C
2. 5% SILVER MICA

TABLE S 6

C 7	C 8	R 16	BEZEL ASS'Y. 10-2524 -	MASKED WINDOW 19-194-
			02	2
100 pf [2]			01	1
43-339				
1000 pf [2]	12 pf	OMIT	01	1
43-340	TRIMMER			
.01 uf [3]			01	1
43-298	43-384			
.1 uf [3]			01	1
43-297				
		1000 Ω	04	4
		15K-1001 WA4		
		100 Ω	03	3
		15-5369		
OMIT		10 Ω	03	3
		15-5368		
		1 Ω	03	3
		15-5367		
		.1 Ω	05	5
		15-4200		

3. 10% MYLAR

AC CONVERTER REPLACEABLE PARTS

REF. NO.	DESCRIPTION	PART NO.
BDA1	P. C. Board w/comp.	87-266
C1	Capacitor .47 uf 10 V	43-336
C2	Capacitor 10 uf 10 V	43-385
C3	Capacitor 18 pf 1 K	43-197
C4	Capacitor 100 pf 1 KV	43-360
C5	Capacitor 10 uf 10 V	43-385
C6	Capacitor 10 uf 10 V	43-385
C7	See Table S 6	
C8	See Table S 6	
C9	Capacitor .02 uf 1 KV	43-337
C9 (1.999 V)	Capacitor .1 uf 400 V	43-69
CR1	Diode 1N914	127-44
CR2	Diode 1N914	127-44
CR3	Transistor 2N5134	127-60
CR4	Transistor 2N5134	127-60
Q1	Transistor 2N5457	127-53
Q2	Transistor 2N5138	127-72
QA1	Integrated Circuit	126-40
R1	Resistor 499 K Prec.	15K-4993WB4
R2	Resistor 499 K Prec.	15K-4993WB4
R3	Resistor 9.09 K Prec.	15K-9091WB4
R4	Resistor 9.09 K Prec.	15K-9091WB4
R5	Resistor 2.21 K Prec.	15K-2211WB4
R6	Resistor 499 K Prec.	15K-4993WB4
R7	Resistor 22 K Comp.	15R-223KB
R8	Resistor 22.1 K Prec.	15K-2212WB4
R9	Resistor 10 K Comp.	15R-103KB
R10	Resistor 1.5 K Comp.	15R-152KB
R11	Resistor 47 K Comp.	15R-473KB
R12	Resistor 22 K Comp.	15R-223KB
R13	See Table S 6	
R14	See Table S 6	
R15	See Table S 6	
R16	See Table S 6	
	Cover Cap	10-2506-01
	Spacer, Threaded (2 Req.)	2447-139
	Washer, Rubber (2 Req.)	14-246
	Clamp, Cable	2451-7
	Lock Washer	14-76
	Acorn Nuts (2 Req.)	27-115
	Bezel Ass'y. (See Table S 6)	
	Line Cord	2566-51